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PATENT ABSTRACTS OF JAPAN

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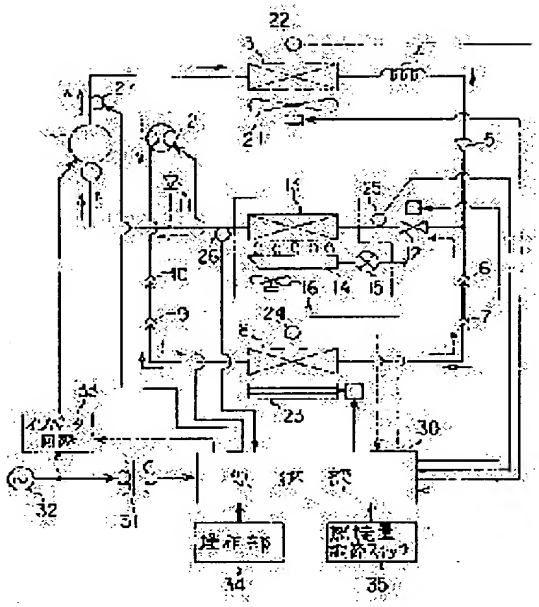
(54) REFRIGERANT HEATING TYPE COOLER/HEATER

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a refrigerant heating type cooler/heater in which rising rate is enhanced at the time of heating.

SOLUTION: If the outer air temperature is low and the refrigeration cycle temperature is low at the time of starting the heating operation, combustion rate of a combustor attached to a refrigerant heater 13 is increased over the maximum rated combustion rate at the time of normal heating operation.



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CLAIMS

[Claim(s)]

[Claim 1] A capacity adjustable compressor characterized by providing the following, a four-way valve, an outdoor heat exchanger, By having a combustor, an outdoor fan, and an indoor fan for heating a pressure reducer, indoor heat exchanger, a closing motion valve, a refrigerating cycle that has a refrigerant heater, and said refrigerant heater, and controlling a four-way valve and a closing motion valve of a refrigerating cycle A control means for cooling operation which a close cycle which makes sequential connection of a compressor, a four-way valve, an outdoor heat exchanger, a pressure reducer, and the indoor heat exchanger is constituted at the time of cooling operation, and carries out operation control of the compressor by capacity width of face from low driving ability to the maximum driving ability, A control means for heating operation which a close cycle which makes sequential connection of a compressor, a four-way valve, indoor heat exchanger, and the refrigerant heater is constituted at the time of heating operation, and performs combustion control of a combustor, and sets up the maximum driving ability value of a compressor lower than a maximum capacity value for cooling operation, and carries out operation control of the compressor by the capacity width of face, A preparation ****** heating type air conditioner A detection means by which an OAT detects a condition that it is low and refrigerating cycle temperature is also low A heating starting control means which usually raises the amount of combustion of the rear-spring-supporter aforementioned combustor to predetermined time by detecting signal of this detection means from the amount of maximum rating combustion at the time of heating operation at the time of initiation of heating operation

[Claim 2] It is the refrigerant heating type air conditioner characterized by having a means by which a heating starting control means usually heightens driving ability of a compressor from the maximum driving ability at the time of heating operation further in a refrigerant heating type air conditioner according to claim 1.

[Claim 3] It is the refrigerant heating type air conditioner characterized by a coolant-temperature sensor by which said detection means detects a regurgitation coolant temperature of said compressor in a refrigerant heating type air conditioner according to claim 1 or 2 having constituted, and making it output a detecting signal at the time of initiation of heating operation when detection temperature of this coolant-temperature sensor was below the set point.

[Claim 4] It is the refrigerant heating type air conditioner characterized by an OAT sensor by which said detection means detects an OAT in a refrigerant heating type air conditioner according to claim 1 or 2, and a coolant-temperature sensor which detects temperature of a refrigerant which flows into said refrigerant heater having constituted, and making it output a detecting signal at the time of initiation of heating operation when both detection temperature of this OAT sensor and detection temperature of a coolant-temperature sensor were below the set points.

[Claim 5] A refrigerant heating type air conditioner characterized by establishing a heating starting control means in which predetermined time carries out a rear-spring-supporter high-speed revolution at the time of initiation of heating operation of said indoor fan in a refrigerant heating type air conditioner according to claim 1 or 2.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the refrigerant heating type air conditioner which formed the refrigerant heater in the refrigerating cycle.
[0002]
[Description of the Prior Art] Piping connection of a compressor, a four-way valve, an outdoor heat exchanger, a pressure reducer, and the indoor heat exchanger is made, a refrigerating cycle is constituted, it applies to a compressor's intake side from between indoor heat exchanger and pressure reducers further, and there is a refrigerant heating type air conditioner which made piping connection and formed the refrigerant heater.
[0003] The combustor is prepared in the refrigerant heater and the interior of a room can be heated by heating a refrigerant heater with a combustor.
[0004]
[Problem(s) to be Solved by the Invention] Like winter, when an OAT is low, a refrigerant falls asleep in a refrigerating cycle during shutdown, and the temperature of the refrigerant in a compressor becomes quite low. Even if heating operation is started in this condition, by the time the interior of a room gets warm, it will take long time amount.
[0005] This invention is a thing in consideration of the above-mentioned situation, and aims at offering the refrigerant heating type heating apparatus which can improve the standup speed at the time of heating.
[0006]
[Means for Solving the Problem] If an OAT is low and a refrigerant heating type heating apparatus of invention concerning claim 1 has a low refrigerating cycle temperature at the time of initiation of heating operation, a detection means will output a detecting signal. At this time, the amount of combustion of a combustor is usually raised over predetermined time from the amount of maximum rating combustion at the time of heating operation.
[0007]
[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention is explained with reference to a drawing.
[0008] As shown in drawing 1 , piping connection of the outdoor heat exchanger 3 is made through a four-way valve 2 in the delivery of the capacity adjustable compressor 1. Piping connection of the indoor heat exchanger 8 is made at this outdoor heat exchanger 3 through the capillary tube 4 which is a pressure reducer, the check valve 5 for cooling cycle formation, and pack DOBARUBU 6 and 7. And piping connection of the indoor heat exchanger 8 is made at the inlet port of a compressor 1 through pack DOBARUBU 9 and 10, the above-mentioned four-way valve 2, and a check valve 11.
[0009] From the pipe between a check valve 5 and pack DOBARUBU 6, it applies to the pipe by the side of intake of a compressor 1, and piping connection of the refrigerant heater 13 is made through the closing motion valve (two-way valve) 12.
[0010] The refrigerant heater 13 is been [a combustor] attached and equipped with the combustor which consists of a gas burner 14, a proportioning valve 15, and a Blois fan 16, and heats a refrigerant by combustion of a gas burner 14. About the amount of heating, it controls by adjusting the amount of fuel

supply to a gas burner 14 (capacity) by the proportioning valve 15. Moreover, combustion air is supplied to a gas burner 14 by the Blois fan 16.

[0011] The outdoor fan 21 and the OAT sensor 22 are formed near the outdoor heat exchanger 3. A sensor 24 is formed whenever [indoor fan 23 and room air temperature] near the indoor heat exchanger 8.

[0012] The coolant-temperature sensor 25 is attached in entrance-side piping of the refrigerant heater 13. The coolant-temperature sensor 26 is attached in outlet side piping of the refrigerant heater 13. Moreover, the coolant-temperature sensor 27 is attached in discharge-side piping of a compressor 1.

[0013] On the other hand, a control section 30 is connected to AC power supply 32 through the transformer 31 for pressure lowering. A control section 30 performs control covering a refrigerant heating type air conditioner at large.

[0014] A sensor 24, the coolant-temperature sensors 25 and 26, an inverter circuit 33, a control unit 34, and the switch 35 for the amount accommodation of combustion are connected to this control section 30 whenever [four-way valve 2, closing motion valve 12, above-mentioned combustor, outdoor fan 21, OAT sensor 22, indoor fan 23, and room air temperature].

[0015] An inverter circuit 33 rectifies supply voltage, and changes and outputs it to the voltage of the frequency according to the command from a control section 30. This output turns into actuation power of a compressor 1. The switch 35 for the amount accommodation of combustion operates, when installation people and a serviceman adjust at the time of installation of equipment, and inspection etc. so that the combustor of the refrigerant heater 13 may become in the range of the predetermined amount of the maximum combustion, and the amount of the minimum combustion, and in order that it can check the combustion condition of a combustor at the time of actuation and may improve actuation workability, generally it is formed in the outdoor unit side with which the refrigerant heater 13 is formed. And this switch 35 for the amount accommodation of combustion is equipped with the 1st accommodation mode and the 2nd accommodation mode as a content of setting out.

[0016] A control section 30 is mainly equipped with the following functional means.

[0017] [1] The control means for cooling operation which sets a four-way valve 2 as cooling mode, constitutes closing and the close cycle which makes sequential connection of a compressor 1, a four-way valve 2, an outdoor heat exchanger 3, a capillary tube 4, a check valve 5, and the indoor heat exchanger 8 by this for the closing motion valve 12, and carries out operation control (the output frequency F of an inverter circuit 33 is controlled) of the compressor 1 by the capacity width of face from low driving ability to the maximum driving ability.

[0018] [2] The control means for heating operation which switches a four-way valve 2, constitutes an aperture and the close cycle which makes sequential connection of a compressor 1, a four-way valve 2, indoor heat exchanger 8, the closing motion valve 12, and the refrigerant heater 13 by this for the closing motion valve 12, and performs combustion control (combustion control of a gas burner 14) of a combustor, and sets up the maximum driving ability value of a compressor 1 lower than the maximum capacity value for cooling operation, and carries out operation control of the compressor 1 by the capacity width of face.

[0019] [3] An overload protection means to detect the overload of a compressor 1 and to stop operation. For example, if the detection temperature Teo of the coolant-temperature sensor 26 carries out abnormal temperature lifting and reaches the set point at the time of heating operation, operation of a compressor 1 and combustion of a combustor will be suspended.

[0020] [4] A means to set the combustor of the driving ability of a compressor 1, a four-way valve 2, the closing motion valve 12, and the refrigerant heater 13 as the predetermined operational status for the amount accommodation of combustion if the 1st accommodation mode is set up with the amount accommodation switch 35 of combustion. A four-way valve 2 is switched and, specifically, it is a closing motion valve. 12 is opened, operation ON of a compressor 1 and the combustor is carried out further, and the driving ability of a compressor 1 is usually heightened from the maximum driving ability at the time of heating operation.

[0021] [5] The means which will usually raise the detection actuation level of an overload protection means from the detection actuation level at the time of heating operation if the 1st accommodation mode is set

up with the amount accommodation switch 35 of combustion.
[0022] [6] A means to constitute the close cycle which sets a four-way valve 2 as cooling mode, and sets the closing motion valve 12 as the condition in heating mode (it opens) and by which sequential connection of a compressor 1, a four-way valve 2, an outdoor heat exchanger 3, a capillary tube 4, a check valve 5, the closing motion valve 12, and the refrigerant heater 13 will be made if the 2nd accommodation mode is set up with the amount accommodation switch 35 of combustion.
[0023] [7] The regurgitation coolant temperature (detection temperature of the coolant-temperature sensor 27) Td of a compressor 1 is the set point T1 at the time of initiation of heating operation. Heating starting control means which will usually raise the amount of combustion of a rear-spring-supporter combustor to predetermined time from the amount of maximum rating combustion at the time of heating operation if it is the following.
[0024] [8] The means which carries out the rear-spring-supporter high-speed revolution of the indoor fan 23 at predetermined time at the time of initiation of heating operation.
[0025] Below, an operation of the above-mentioned configuration is explained with reference to the flow chart of drawing 2 and drawing 3 .
[0026] After installation of the main part of equipment finishes, it is necessary to adjust the amount of combustion of the combustor of the refrigerant heater 13. In performing this accommodation, authorized personnel operate the amount accommodation switch 35 of combustion, and set up the 1st accommodation mode.
[0027] If the 1st accommodation mode is set up, a four-way valve 2 will be switched and operation ON of an aperture, a compressor 1, and the combustor will be carried out for the closing motion valve 12. This forms the same cycle as heating operation.
[0028] And as shown in drawing 4 , the driving ability (the output frequency F of an inverter circuit 33) of a compressor 1 is heightened till a place usually higher than the maximum driving ability (Fmax) at the time of heating operation. It can come, simultaneously the shift up of the detection actuation level ******** release point of an overload protection means is carried out at a place usually higher than the maximum driving ability at the time of heating operation.
[0029] In this way, the standup of heating becomes quick by heightening the driving ability of a compressor 1 till a place usually higher than the maximum driving ability at the time of heating operation. That is, even if it increases the amount of combustion of a combustor to near max, the cycle condition of balancing it is formed in the inside of a short time. And the amount of combustion of a combustor can be increased smoothly to near max, and promptly, without overload protection working unnecessarily, since the shift up of the release point of overload protection is carried out.
[0030] In addition, the dashed line of drawing 4 shows change of the detection temperature for overload protections when not carrying out the shift up of the release point, the amount of combustion, and operation frequency F.
[0031] Therefore, authorized personnel can adjust the amount of combustion of max and a minimum point easily only by operating the amount accommodation switch 35 of combustion, and after operating it moreover, accommodation of the amount of combustion can be started to the inside of a short time.
[0032] By the way, the refrigerant heater 13 has the case where he wants to adjust the amount activity of combustion in the condition that the piping connection by the side of the interior of a room of the point of pack DOBARUBU 6 and 10 is not completed yet like drawing 5 from the place installed in an outdoor side.
[0033] In this case, authorized personnel operate the amount accommodation switch 35 of combustion, and set up the 2nd accommodation mode.
[0034] If the 2nd accommodation mode is set up, while making a four-way valve 2 into cooling mode and opening the closing motion valve 12, operation ON of a compressor 1 and the combustor is carried out, and the cycle shown by the continuous line arrow head is formed in drawing 5 .
[0035] Others are the same as the above-mentioned 1st accommodation mode.
[0036] That is, without requiring the piping connection by the side of the interior of a room, the amount of combustion can be easily adjusted only by operating the amount accommodation switch 35 of combustion,

and after operating it moreover, accommodation of the amount of combustion can be started to the inside of a short time.

[0037] Next, the completion of an installation injury is carried out, accommodation of the amount of combustion also finishes, and the operation in the case of performing actual operation is explained.

[0038] If winter and shutdown continue, a refrigerant will fall asleep in a refrigerating cycle. At this time, the temperature of the refrigerant in a compressor 1 is the set point T1. It is in a far low condition.

[0039] Then, as shown in the flow chart of drawing 6 , the regurgitation coolant temperature (detection temperature of the coolant-temperature sensor 27) Td and the set point T1 (for example, 48 degrees C) of a compressor 1 are compared at the time of initiation of heating operation.

[0040] The regurgitation coolant temperature Td is the set point T1. If low, while usually raising a rear spring supporter and the amount of combustion of a combustor to fixed time amount from the amount of maximum rating combustion at the time of heating operation, the driving ability of a compressor 1 is usually heightened from the maximum driving ability at the time of heating operation.

[0041] The amount of combustion of a combustor is proportional to the opening of a proportioning valve 15, as shown in drawing 8 , and the opening "63" of a proportioning valve 15 usually corresponds to the amount of maximum rating combustion at the time of heating operation. Usually raising the amount of combustion of a combustor from the amount of maximum rating combustion at the time of heating operation is a larger thing to set it, for example as "72" than "63" about the opening of a proportioning valve 15. And with this amount change of combustion, as shown in drawing 9 , the Blois fan's 16 rotational frequency increases, and the amount of the combustion air supplied to a gas burner 14 is increased.

[0042] By carrying out like this, the start of heating becomes quick, and even if the regurgitation coolant temperature Td is low, the interior of a room can be heated quickly. Moreover, the high-speed revolution of the indoor fan 23 is carried out in order to bring the start of heating forward further, it doubles increasing air capacity and it is performed. After the fixed passage of time performs the usual heating operation.

[0043] In addition, it is OAT To besides lowering of the regurgitation coolant temperature Td as a cause by which the standup of heating capacity becomes late. And lowering of the temperature Tei of the refrigerant which flows into the refrigerant heater 13 can be considered. This OAT To And the control using a coolant temperature Tei is shown in the flow chart of drawing 7 .

[0044] Namely, OAT To which the OAT sensor 22 detects at the time of initiation of heating operation Set point T2 The coolant temperature Tei and set point T3 which are compared and the coolant-temperature sensor 25 detects further It compares.

[0045] OAT To Set point T2 It is low and, moreover, a coolant temperature Tei is set point T3. If low, while usually raising a rear spring supporter and the amount of combustion of a combustor to fixed time amount from the amount of maximum rating combustion at the time of heating operation, the driving ability of a compressor 1 is usually heightened from the maximum driving ability at the time of heating operation.

[0046] By carrying out like this, the start of heating becomes quick and it is OAT To even if. And even if a coolant temperature Tei is low, the interior of a room can be heated quickly. Moreover, the high-speed revolution of the indoor fan 23 is carried out in order to bring the start of heating forward further, it doubles increasing air capacity and it is performed. After the fixed passage of time performs the usual heating operation.

[0047]

[Effect of the Invention] As stated above, according to this invention, the refrigerant heating type heating apparatus which can improve the standup speed at the time of heating can be offered.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The refrigerating cycle of 1 operation gestalt, and the block diagram of a control circuit.
[Drawing 2] The flow chart for explaining an operation of the 1st accommodation mode of this operation gestalt.
[Drawing 3] The flow chart for explaining an operation of the 2nd accommodation mode of this operation gestalt.
[Drawing 4] Drawing showing change of the detection temperature for overload protections of this operation gestalt, the amount of combustion, and operation frequency.
[Drawing 5] Drawing showing the refrigerant flow in the 2nd accommodation mode of this operation gestalt.
[Drawing 6] The flow chart for explaining the operation at the time of heating initiation of this operation gestalt.
[Drawing 7] The flow chart for explaining the modification of the operation at the time of heating initiation of this operation gestalt.
[Drawing 8] Drawing showing the relation between the proportioning valve opening of this operation gestalt, and the amount of combustion.
[Drawing 9] Drawing showing the relation between the amount of combustion of this operation gestalt, and the Blois fan's rotational frequency.
[Description of Notations]
1 [-- A capillary tube (pressure reducer), 8 / -- Indoor heat exchanger, 12 / -- A closing motion valve, 13 / -- A refrigerant heater, 14 / -- A gas burner, 15 / -- A proportioning valve, 16 / -- The Blois fan, 25, 26 27 / -- A coolant-temperature sensor, 30 / -- A control section, 33 / -- Inverter circuit.] -- A capacity adjustable compressor, 2 -- A four-way valve, 3 -- An outdoor heat exchanger, 4

[Translation done.]

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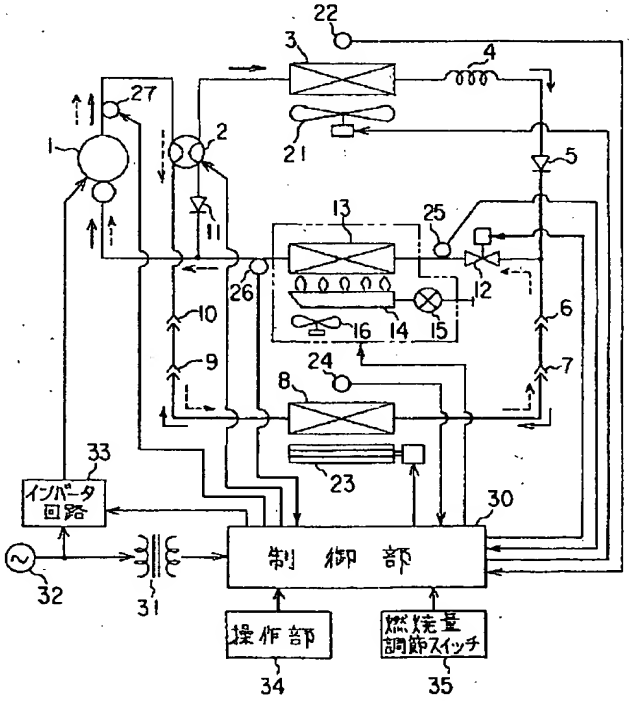
最終頁に続く

(54)【発明の名称】　冷媒加熱式冷暖房装置

(57)【要約】
【課題】　暖房時の立上り速度を向上できる冷媒加熱式暖房装置を提供する。
【解決手段】　暖房運転の開始時、外気温度が低くかつ冷凍サイクル温度が低ければ、所定時間にわたり、冷媒加熱器１３に付属の燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高める。



【特許請求の範囲】

【請求項１】　能力可変の圧縮機、四方弁、室外熱交換器、減圧器、室内熱交換器、開閉弁、冷媒加熱器を有する冷凍サイクル、前記冷媒加熱器を加熱するための燃焼器、室外ファン、および室内ファンを備え、冷凍サイクルの四方弁および開閉弁を制御することにより、冷房運転時は圧縮機、四方弁、室外熱交換器、減圧器、室内熱交換器を順次接続する閉サイクルを構成して圧縮機を低運転能力から最大運転能力までの能力幅で運転制御する冷房運転用制御手段と、暖房運転時は圧縮機、四方弁、室内熱交換器、冷媒加熱器を順次接続する閉サイクルを構成して燃焼器の燃焼制御を行ない且つ圧縮機の最大運転能力値を冷房運転用の最大能力値より低く設定しその能力幅で圧縮機を運転制御する暖房運転用制御手段と、を備えた冷媒加熱式冷暖房装置において、

外気温度が低くかつ冷凍サイクル温度も低い状態を検出する検出手段と、この検出手段の検出信号により、暖房運転の開始時に、所定時間にわたり前記燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高める暖房立上げ制御手段と、を設けたことを特徴とする冷媒加熱式冷暖房装置。

【請求項２】　請求項１に記載の冷媒加熱式冷暖房装置において、暖房立上げ制御手段は、さらに、圧縮機の運転能力を通常暖房運転時の最大運転能力より高める手段を備えたことを特徴とする冷媒加熱式冷暖房装置。

【請求項３】　請求項１または請求項２に記載の冷媒加熱式冷暖房装置において、前記検出手段は、前記圧縮機の吐出冷媒温度を検知する冷媒温度センサにより構成し、暖房運転の開始時に、この冷媒温度センサの検知温度が設定値以下であれば、検出信号を出力するようにしたことを特徴とする冷媒加熱式冷暖房装置。

【請求項４】　請求項１または請求項２に記載の冷媒加熱式冷暖房装置において、前記検出手段は、外気温度を検知する外気温度センサと、前記冷媒加熱器に流入する冷媒の温度を検知する冷媒温度センサとにより構成し、暖房運転の開始時に、この外気温度センサの検知温度および冷媒温度センサの検知温度がともに設定値以下であれば、検出信号を出力するようにしたことを特徴とする冷媒加熱式冷暖房装置。

【請求項５】　請求項１または請求項２に記載の冷媒加熱式冷暖房装置において、前記室内ファンを暖房運転の開始時に、所定時間にわたり高速回転せしめる暖房立上げ制御手段を設けたことを特徴とする冷媒加熱式冷暖房装置。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】この発明は、冷凍サイクルに冷媒加熱器を設けた冷媒加熱式冷暖房装置に関する。

【０００２】

【従来の技術】圧縮機、四方弁、室外熱交換器、減圧器、および室内熱交換器を配管接続して冷凍サイクルを構成し、さらに室内熱交換器と減圧器との間から圧縮機の吸込側にかけて冷媒加熱器を配管接続して設けた冷媒加熱式冷暖房装置がある。

【０００３】冷媒加熱器には燃焼器が設けられており、燃焼器で冷媒加熱器を加熱することにより、室内を暖房することができる。

【０００４】

【発明が解決しようとする課題】冬季のように外気温度が低い場合、運転停止中に冷凍サイクル中に冷媒が寝込んでしまい、圧縮機内の冷媒の温度がかなり低くなる。この状態で暖房運転が開始されても、室内が暖まるまでに長い時間がかかってしまう。

【０００５】この発明は、上記の事情を考慮したもので、暖房時の立上り速度を向上できる冷媒加熱式暖房装置を提供することを目的とする。

【０００６】

【課題を解決するための手段】請求項１に係る発明の冷媒加熱式暖房装置は、暖房運転の開始時、外気温度が低くかつ冷凍サイクル温度が低ければ、検出手段が検出信号を出力する。このとき、所定時間にわたって燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高める。

【０００７】

【発明の実施の形態】以下、この発明の一実施形態について図面を参照して説明する。

【０００８】図１に示すように、能力可変の圧縮機１の吐出口に四方弁２を介して室外熱交換器３を配管接続する。この室外熱交換器３に、減圧器であるキャピラリチューブ４、冷房サイクル形成用の逆止弁５、パックドバルブ６，７を介して室内熱交換器８を配管接続する。そして、室内熱交換器８をパックドバルブ９，１０、上記四方弁２および逆止弁１１を介して圧縮機１の吸込口に配管接続する。

【０００９】逆止弁５とパックドバルブ６との間の管から、圧縮機１の吸込側の管にかけて、開閉弁（二方弁）１２を介して冷媒加熱器１３を配管接続する。

【００１０】冷媒加熱器１３は、ガスバーナ１４、比例弁１５、およびブロアファン１６からなる燃焼器を付属して備え、ガスバーナ１４の燃焼によって冷媒を加熱する。加熱量については、ガスバーナ１４への燃料供給量（ガス量）を比例弁１５で調節することによりコントロールする。また、ブロアファン１６により燃焼用空気をガスバーナ１４に供給する。

【００１１】室外熱交換器３の近傍に室外ファン２１および外気温度センサ２２を設ける。室内熱交換器８の近傍に室内ファン２３および室内温度センサ２４を設ける。

【００１２】冷媒加熱器１３の入口側配管に冷媒温度センサ２５を取付ける。冷媒加熱器１３の出口側配管に冷媒温度センサ２６を取付ける。また、圧縮機１の吐出側

3

配管に冷媒温度センサ２７を取付ける。

【００１３】一方、制御部３０を降圧用トランス３１を介して交流電源３２に接続する。制御部３０は、冷媒加熱式冷暖房装置の全般にわたる制御を行なう。

【００１４】この制御部３０に、四方弁２、開閉弁１２、上記燃焼器、室外ファン２１、外気温度センサ２２、室内ファン２３、室内温度センサ２４、冷媒温度センサ２５，２６、インバータ回路３３、操作部３４、および燃焼量調節用スイッチ３５を接続する。

【００１５】インバータ回路３３は、電源電圧を整流し、それを制御部３０からの指令に応じた周波数の電圧に変換し、出力する。この出力は圧縮機１の駆動電力となる。燃焼量調節用スイッチ３５は、装置の据付時や点検時などに、据付工事人やサービスマンが、冷媒加熱器１３の燃焼器が所定の最大燃焼量と最小燃焼量の範囲になるよう調節するときに操作するもので、一般には、操作時に燃焼器の燃焼状態が確認でき、操作作業性を良くするため、冷媒加熱器１３が設けられている室外ユニット側に設けられる。そして、この燃焼量調節用スイッチ３５は、設定内容として第１調節モードおよび第２調節モードを備えている。

【００１６】制御部３０は、主として次の機能手段を備える。

【００１７】［１］四方弁２を冷房モードに設定して開閉弁１２を閉じ、これにより圧縮機１、四方弁２、室外熱交換器３、キャピラリチューブ４、逆止弁５、室内熱交換器８を順次接続する閉サイクルを構成し、圧縮機１を低運転能力から最大運転能力までの能力幅で運転制御（インバータ回路３３の出力周波数Ｆを制御）する冷房運転用制御手段。

【００１８】［２］四方弁２を切換えて開閉弁１２を開き、これにより圧縮機１、四方弁２、室内熱交換器８、開閉弁１２、冷媒加熱器１３を順次接続する閉サイクルを構成し、燃焼器の燃焼制御（ガスバーナ１４の燃焼制御）を行ない且つ圧縮機１の最大運転能力値を冷房運転用の最大能力値より低く設定しその能力幅で圧縮機１を運転制御する暖房運転用制御手段。

【００１９】［３］圧縮機１の過負荷を検出して運転を停止させる過負荷保護手段。たとえば、暖房運転時、冷媒温度センサ２６の検知温度Ｔeoが異常温度上昇して設定値に達すると、圧縮機１の運転および燃焼器の燃焼を停止する。

【００２０】［４］燃焼量調節スイッチ３５で第１調節モードが設定されると、圧縮機１の運転能力、四方弁２、開閉弁１２、冷媒加熱器１３の燃焼器を燃焼量調節用の所定の運転状態に設定する手段。具体的には、四方弁２を切換えて開閉弁　１２を開き、さらに圧縮機１および燃焼器を運転オンし、圧縮機１の運転能力を通常暖房運転時の最大運転能力より高める。

【００２１】［５］燃焼量調節スイッチ３５で第１調節

4

モードが設定されると、過負荷保護手段の検出動作レベルを通常暖房運転時の検出動作レベルより高める手段。

【００２２】［６］燃焼量調節スイッチ３５で第２調節モードが設定されると、四方弁２を冷房モード、開閉弁１２を暖房モード（開く）の状態に設定して、圧縮機１、四方弁２、室外熱交換器３、キャピラリチューブ４、逆止弁５、開閉弁１２、冷媒加熱器１３が順次接続される閉サイクルを構成する手段。

【００２３】［７］暖房運転の開始時、圧縮機１の吐出冷媒温度（冷媒温度センサ２７の検知温度）Ｔｄが設定値T_1以下であれば、所定時間にわたり燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高める暖房立上げ制御手段。

【００２４】［８］暖房運転の開始時、室内ファン２３を所定時間にわたり高速回転する手段。

【００２５】つぎに、上記の構成の作用について図２および図３のフローチャートを参照して説明する。

【００２６】装置本体の据付けが終わった時点で、冷媒加熱器１３の燃焼器の燃焼量を調節する必要がある。この調節を行なうに当たり、作業員は燃焼量調節スイッチ３５を操作して第１調節モードを設定する。

【００２７】第１調節モードが設定されると、四方弁２を切換えて開閉弁１２を開き、圧縮機１および燃焼器を運転オンする。これにより、暖房運転と同じサイクルを形成する。

【００２８】そして、図４に示すように、圧縮機１の運転能力（インバータ回路３３の出力周波数Ｆ）を通常暖房運転時の最大運転能力（Ｆmax ）より高いところまで高める。これと同時に、過負荷保護手段の検出動作レベルいわゆるレリース点を通常暖房運転時の最大運転能力より高いところにシフトアップする。

【００２９】こうして、圧縮機１の運転能力を通常暖房運転時の最大運転能力より高いところまで高めることにより、暖房の立上りが速くなる。つまり、燃焼器の燃焼量を最大付近まで増大してもそれに見合うだけのサイクル状態が短時間のうちに形成される。しかも、過負荷保護のレリース点をシフトアップしているので、不要に過負荷保護が働いてしまうこともなく、燃焼器の燃焼量を最大付近までスムーズかつ迅速に増大させることができる。

【００３０】なお、図４の破線は、レリース点をシフトアップしない場合の過負荷保護用検知温度、燃焼量、運転周波数Ｆの変化を示している。

【００３１】したがって、作業員は、燃焼量調節スイッチ３５を操作するだけで簡単に最大と最小点の燃焼量の調節を行なうことができ、しかも操作をしてから短時間のうちに燃焼量の調節を開始することができる。

【００３２】ところで、冷媒加熱器１３は室外側に設置されるところから、図５のようにパックドバルブ６，１０の先の室内側の配管接続がまだ完了していない状態で

5

燃焼量作業を調節したい場合がある。

【００３３】この場合、作業員は燃焼量調節スイッチ３５を操作して第２調節モードを設定する。

【００３４】第２調節モードが設定されると、四方弁２を冷房モードにして開閉弁１２を開くとともに、圧縮機１および燃焼器を運転オンし、図５に実線矢印で示すサイクルを形成する。

【００３５】その他は上記の第１調節モードと同じである。

【００３６】すなわち、室内側の配管接続を要することなく、燃焼量調節スイッチ３５を操作するだけで簡単に燃焼量の調節を行なうことができ、しかも操作をしてから短時間のうちに燃焼量の調節作業を開始することができる。

【００３７】次に、据付けが完了して燃焼量の調節も終わり、実際の運転を行なう場合の作用について説明する。

【００３８】冬季、運転停止が継続すると、冷凍サイクル中に冷媒が寝込んでしまう。このとき、圧縮機１内の冷媒の温度は設定値T_1よりもはるかに低い状態にある。

【００３９】そこで、図６のフローチャートに示すように、暖房運転の開始時、圧縮機１の吐出冷媒温度（冷媒温度センサ２７の検知温度）Ｔｄと設定値T_1（たとえば48℃）とを比較する。

【００４０】吐出冷媒温度Ｔｄが設定値T_1より低ければ、一定時間にわたり、燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高めるとともに、圧縮機１の運転能力を通常暖房運転時の最大運転能力より高めるようにする。

【００４１】燃焼器の燃焼量は図８に示すように比例弁１５の開度に比例しており、比例弁１５の開度“63”が通常暖房運転時の最大定格燃焼量に対応する。燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高めるということは、比例弁１５の開度を“63”よりも大きいたとえば“72”に設定することである。そして、この燃焼量変化に伴い、図９に示すようにブロアファン１６の回転数が増大され、ガスバーナ１４に供給される燃焼用空気の量が増やされる。

【００42】こうすることにより、暖房の立上がりが速くなり、たとえ吐出冷媒温度Ｔｄが低くても、室内を素早く暖めることができる。また、暖房の立上がりをさらに早めるべく、室内ファン２３を高速回転させ、風量を増大することを合わせて行なう。一定時間の経過後は、通常の暖房運転を行なう。

【００４３】なお、暖房能力の立上りが遅くなる原因として、吐出冷媒温度Ｔｄの低下の他に、外気温度Ｔｏおよび冷媒加熱器１３に流入する冷媒の温度Ｔｅｉの低下が

6

考えられる。この外気温度Ｔｏおよび冷媒温度Ｔｅｉを用いた制御を図７のフローチャートに示す。

【００４４】すなわち、暖房運転の開始時、外気温度センサ２２が検知する外気温度Ｔｏと設定値T_2とを比較し、さらに冷媒温度センサ２５が検知する冷媒温度Ｔｅｉと設定値T_3とを比較する。

【００４５】外気温度Ｔｏが設定値T_2より低く、しかも冷媒温度Ｔｅｉが設定値T_3より低ければ、一定時間にわたり、燃焼器の燃焼量を通常暖房運転時の最大定格燃焼量より高めるとともに、圧縮機１の運転能力を通常暖房運転時の最大運転能力より高めるようにする。

【００４６】こうすることにより、暖房の立上がりが速くなり、たとえ外気温度Ｔｏおよび冷媒温度Ｔｅｉが低くても、室内を素早く暖めることができる。また、暖房の立上がりをさらに早めるべく、室内ファン２３を高速回転させ、風量を増大することを合わせて行なう。一定時間の経過後は、通常の暖房運転を行なう。

【００４７】

【発明の効果】以上述べたように、この発明によれば、暖房時の立上り速度を向上することができる冷媒加熱式暖房装置を提供できる。

【図面の簡単な説明】

【図１】一実施形態の冷凍サイクルおよび制御回路の構成図。

【図２】同実施形態の第１調節モードの作用を説明するためのフローチャート。

【図３】同実施形態の第２調節モードの作用を説明するためのフローチャート。

【図４】同実施形態の過負荷保護用検知温度、燃焼量、運転周波数の変化を示す図。

【図５】同実施形態の第２調節モードでの冷媒流れを示す図。

【図６】同実施形態の暖房開始時の作用を説明するためのフローチャート。

【図７】同実施形態の暖房開始時の作用の変形例を説明するためのフローチャート。

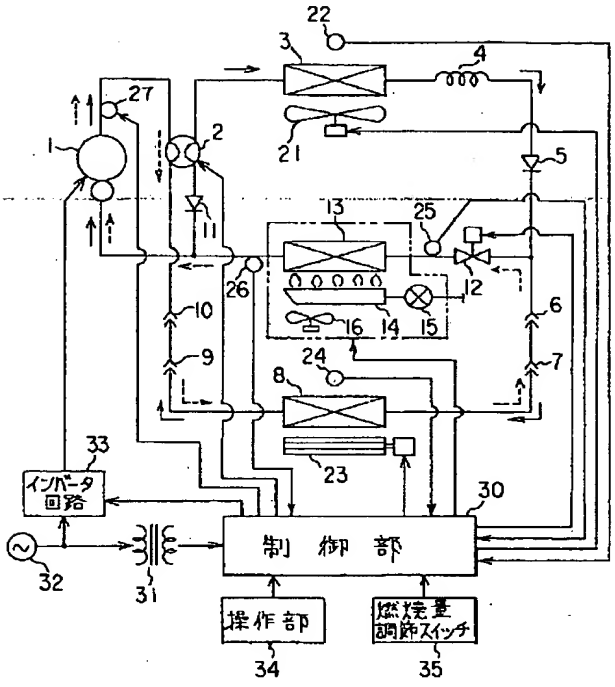
【図８】同実施形態の比例弁開度と燃焼量との関係を示す図。

【図９】同実施形態の燃焼量とブロアファンの回転数との関係を示す図。

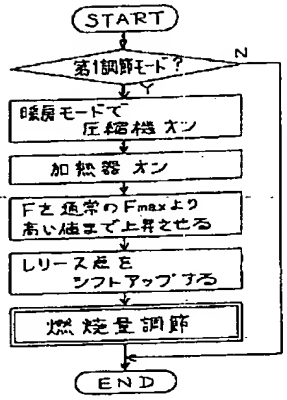
【符号の説明】

１…能力可変の圧縮機、２…四方弁、３…室外熱交換器、４…キャピラリチューブ（減圧器）、８…室内熱交換器、１２…開閉弁、１３…冷媒加熱器、１４…ガスバーナ、１５…比例弁、１６…ブロアファン、２５，２６，２７…冷媒温度センサ、３０…制御部、３３…インバータ回路。

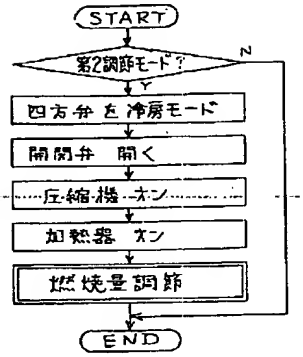
【図１】


22
3
4
27
1
2
21
5
11
13
25
26
12
10
16
14
15
6
9
24
7
8
23
33
インバータ回路
30
制御部
32
31
操作部
燃焼量調節スイッチ
34
35

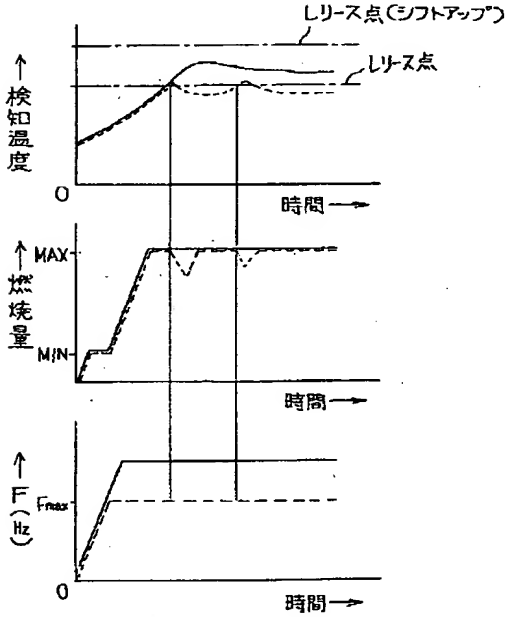
【図２】


START
第1調節モード?
N
Y
暖房モードで圧縮機オン
加熱器オン
Fを通常のFmaxより高い値まで上昇させる
レリース点をシフトアップする
燃焼量調節
END

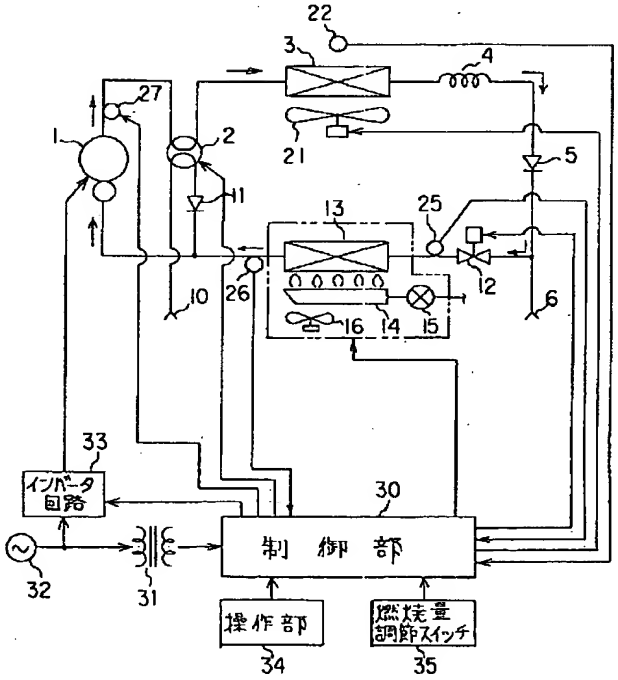
【図３】


START
第2調節モード?
N
Y
四方弁を冷房モード
開閉弁 開く
圧縮機オン
加熱器 オン
燃焼量調節
END

【図４】


レリース点(シフトアップ)
レリース点
検知温度
0
時間
MAX
燃焼量
MIN
時間
F
Fmax
(Hz)
0
時間

【図５】


22
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インバータ回路
30
制御部
32
31
操作部
燃焼量調節スイッチ
34
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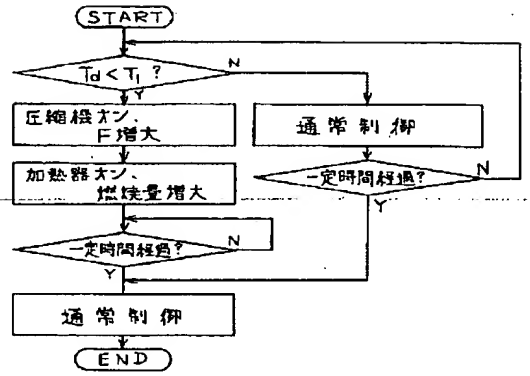
【図６】



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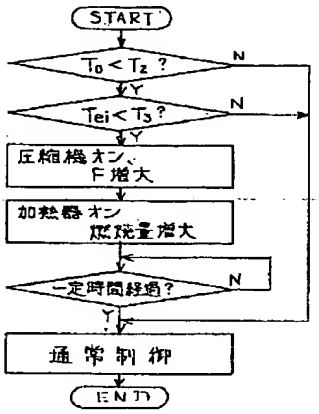

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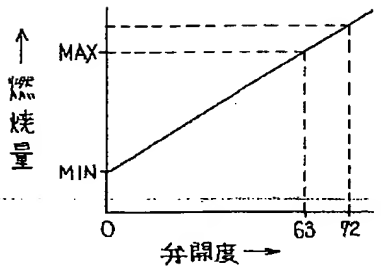
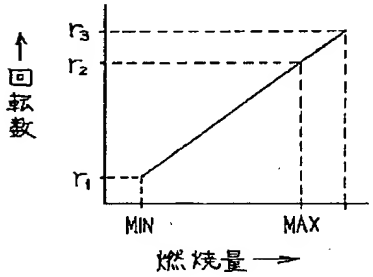


【図９】



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DD05 EE04 EE05 EE07